Small ruminants as a fire management tool in a Mediterranean mountain region

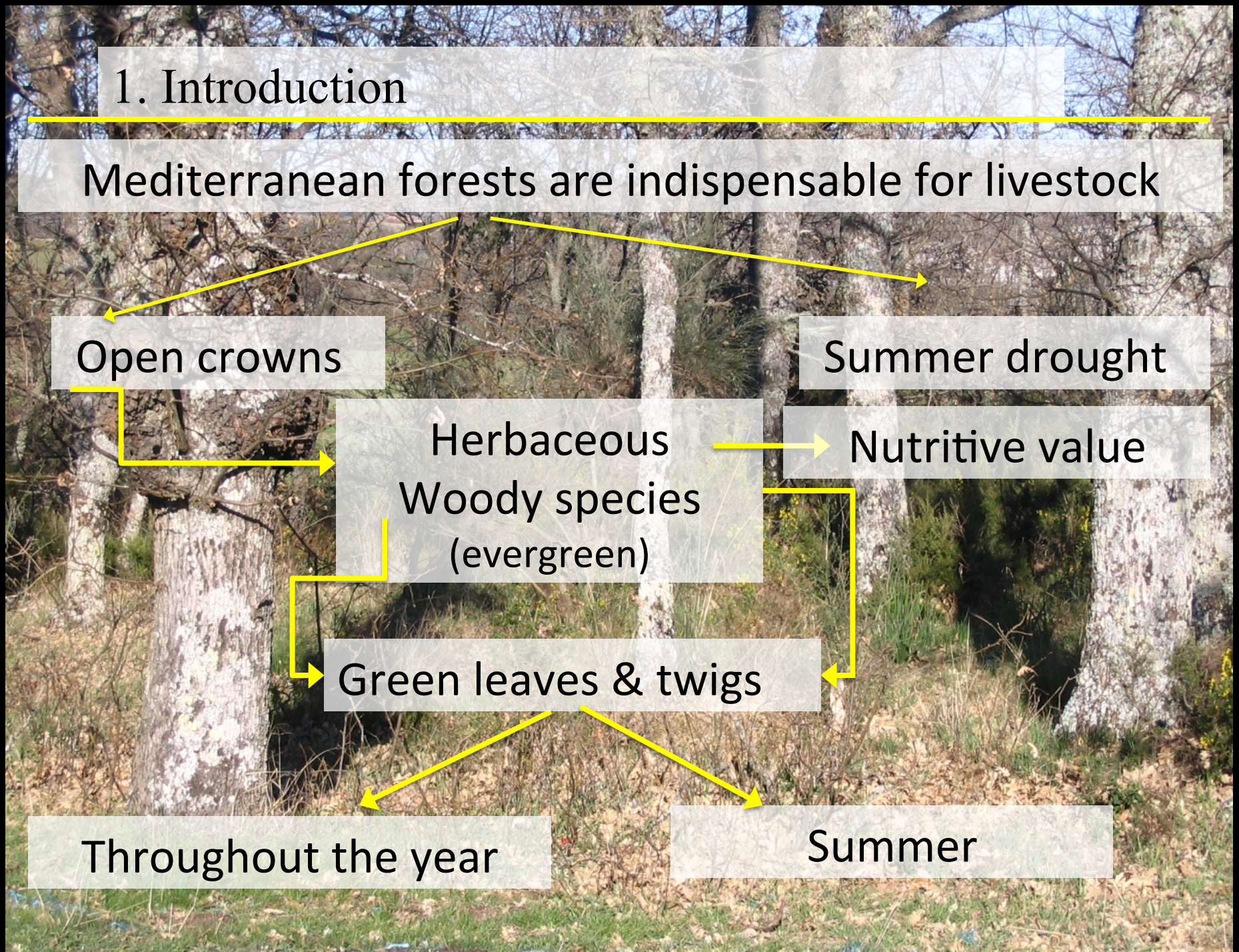
Marina Castro

Esther Fernández-Núñez

Centro de Investigação de Montanha

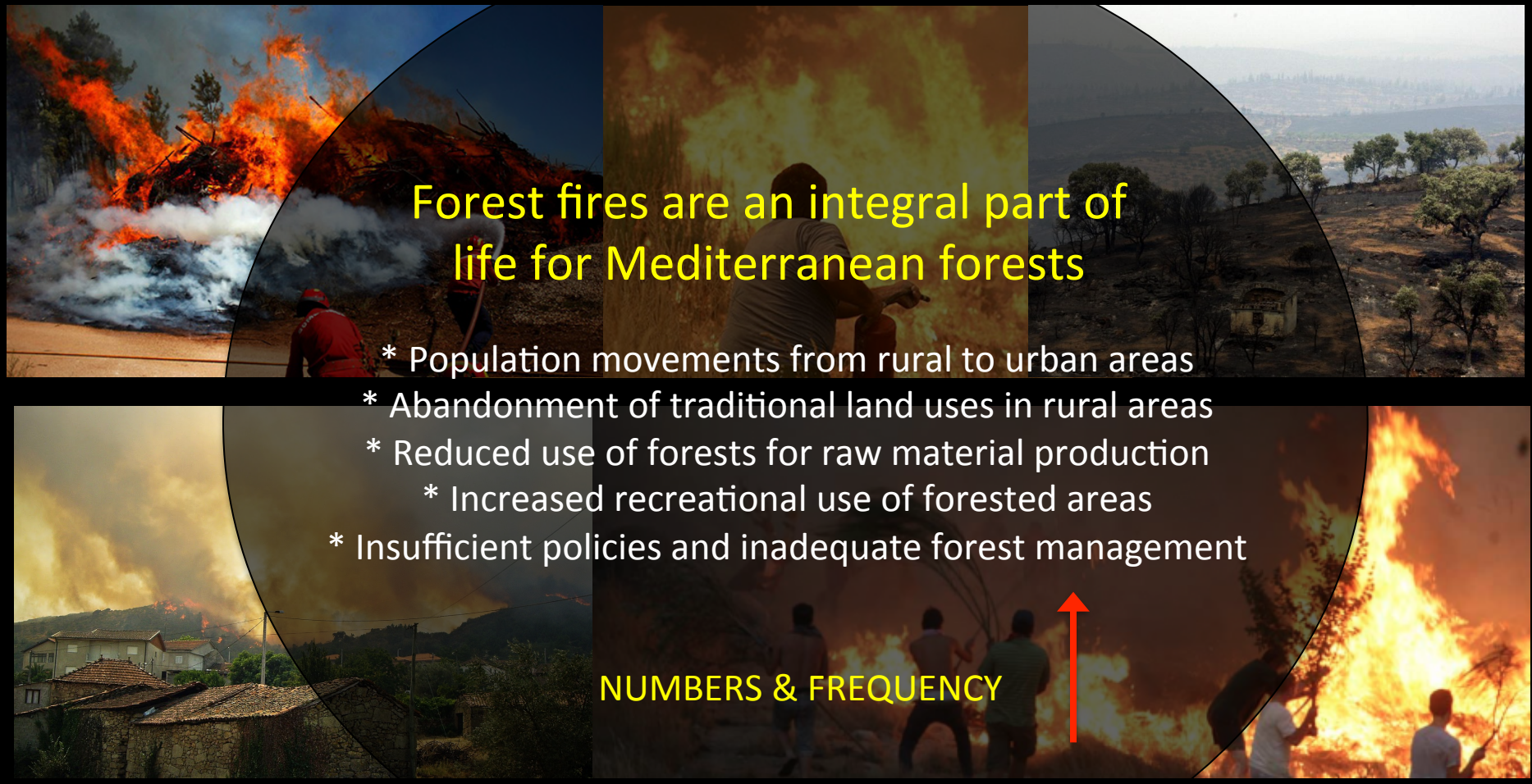
INSTITUTO POLITÉCNICO DE BRAGANÇA

1. Introduction
2. Methodology
3. Results
4. Conclusions


1. Introduction
Mediterranean forests are indispensable for livestock
Open crowns
Summer drought
Herbaceous
Woody species
(evergreen)
Nutritive value
Green leaves & twigs
Throughout the year
Summer

1. Introduction

Alfândega da Fè (Bragança-Portugal 2013): Burnt area: 15,000 ha



Forest fires are an integral part of life for Mediterranean forests

* Population movements from rural to urban areas
* Abandonment of traditional land uses in rural areas
* Reduced use of forests for raw material production
* Increased recreational use of forested areas
* Insufficient policies and inadequate forest management

NUMBERS & FREQUENCY

Chaves (Vila Real-Portugal 2013): Burnt area: 2,300 ha

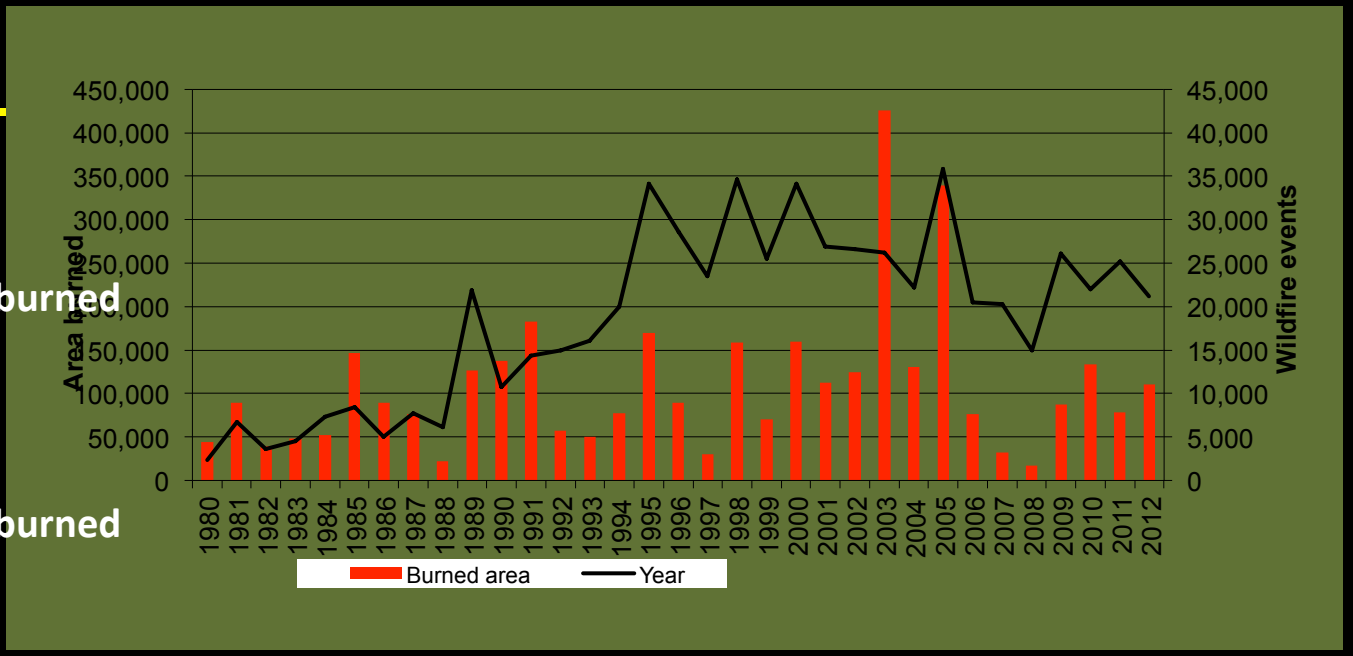
1. Introduction

Year 2003:

25,219 events & 425,839 ha burned

Year 2005:

35,823 events & 339,089 ha burned



Portugal Policy regulations to protect the forest:

1. National Strategy for forest

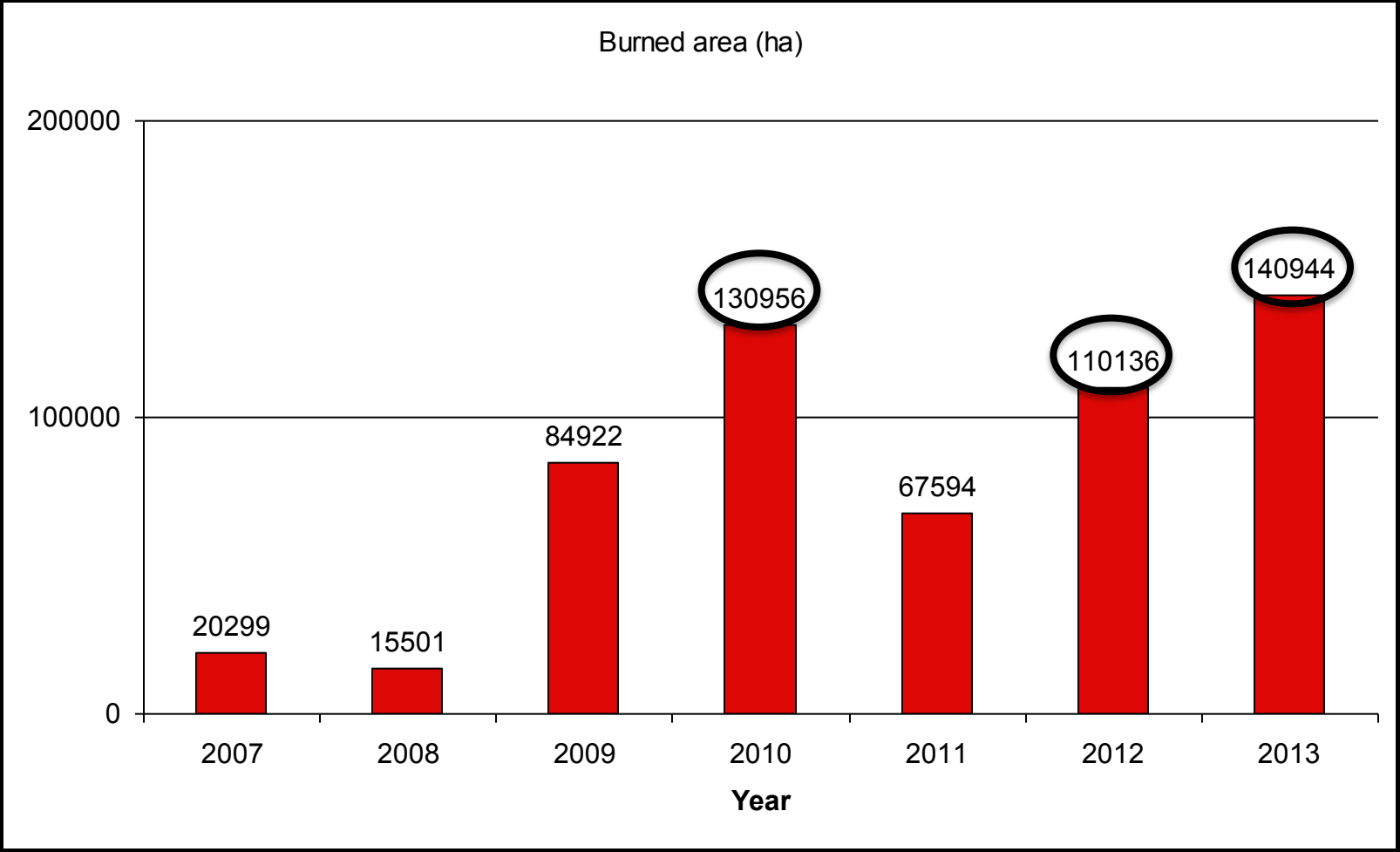
(Council resolution nº114/2006)

2. National defenses plan against forest fires

(PNDFCI, Council resolution nº65/2006)

- 2012 burned area < 100,000 ha
- 2018 burned area forest stands < 0.8% forest land use

1. Introduction



The objective of this study is to compare the diet of goats and sheep in a Silvopastoral system

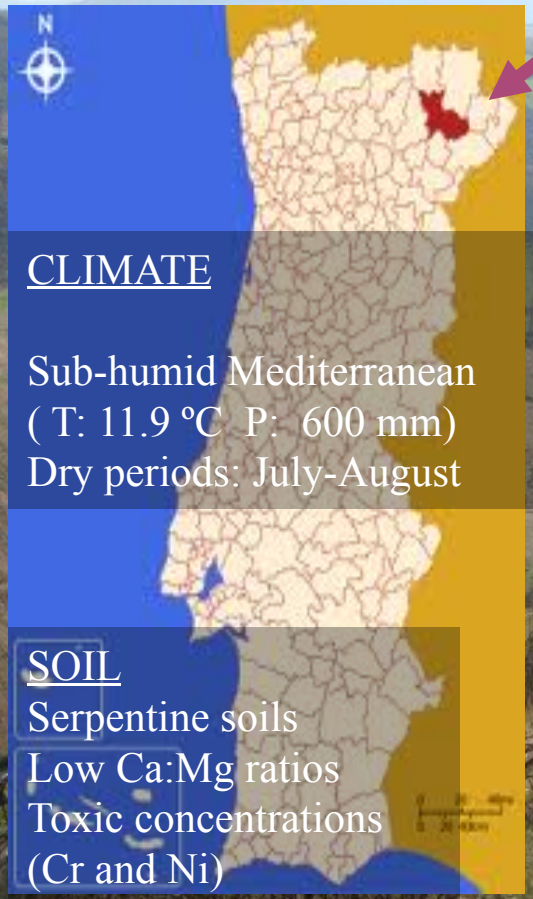
1. Introduction
2. Methodology
3. Results
4. Conclusions

2. Methodology

Study area

ALTITUDE
600 m asl

Morais Nature 2000 Site (PTCON0023)



CLIMATE

Sub-humid Mediterranean
(T: 11.9 ºC P: 600 mm)
Dry periods: July-August

SOIL
Serpentine soils
Low Ca:Mg ratios
Toxic concentrations
(Cr and Ni)

SOCIAL

Subsistence farming
winter cereals
spring crops
olive
vineyards

VEGETATION

Quercus rotundifolia
Quercus suber
Juniperus oxycedrus
Quercus faginea

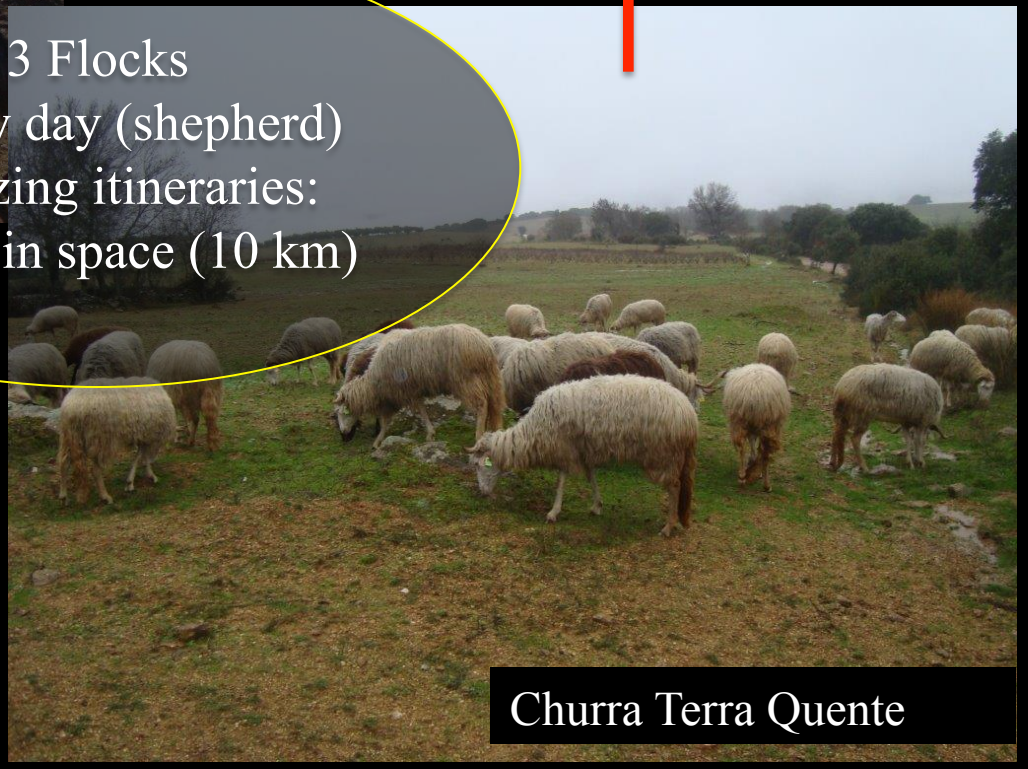
LIVESTOCK

36 livestock farms
17 of sheep (2000 animals)
13 of cattle (126 animals)
7 of goats (480 animals)

2. Methodology **Livestock**

Serrana

3 Flocks
- Every day (shepherd)
- Grazing itineraries: limited in space (10 km)



Churra Terra Quente

2. Methodology **Field observations**

Forage availability and diet composition

Selectivity of species

Animal activity & Grazed species

Availability of species

herbaceous-shrub- tree species

visual observation | 15 minutes | visual estimation

Winter (January) Spring (April) Summer (July) Autumn(September)

Sheep-night

Hand Global Positioning System (GPS)

2. Methodology **Determinations**

Diet selection →

Krueger´s preference index (RP)

$$RPi = \Sigma_{k=1,n} (D_{ik} / RA_{ik}) / n$$

RPi > 1 preference; RPi < 1 avoidance

Forage on offer
&
Diet diversity →

Shannon-Weaver index (H´)

$$H' = -\Sigma p_i \log_{10} p_i$$

Degree of overlap between diets →

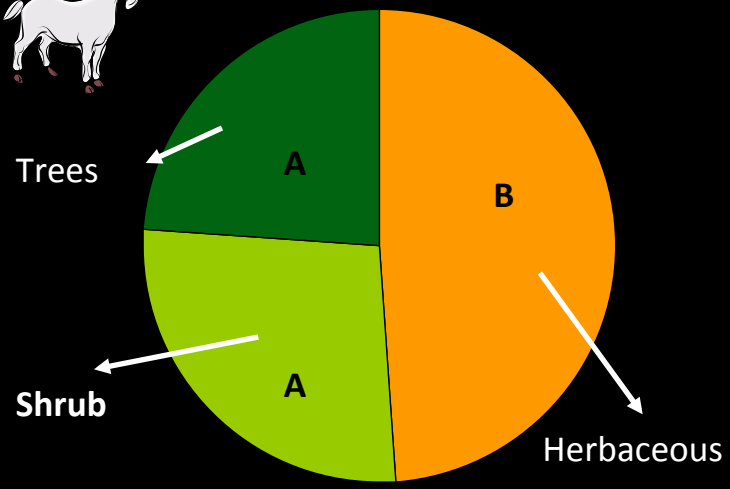
Kulczynski´s Similarity Index (KSI)

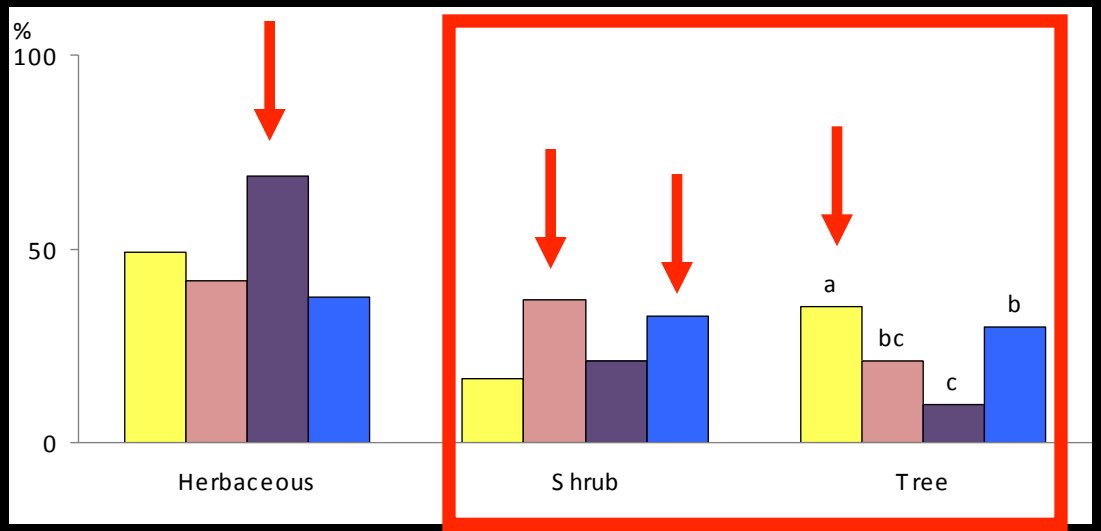
$$KSI = (\Sigma 2W_i / \Sigma (a+b)_i) \times 100$$

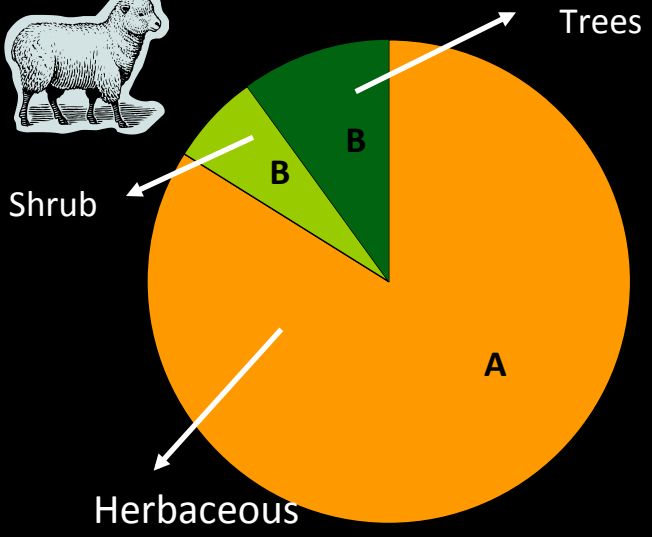
1. Introduction
2. Methodology
3. Results
4. Conclusions

3. Results

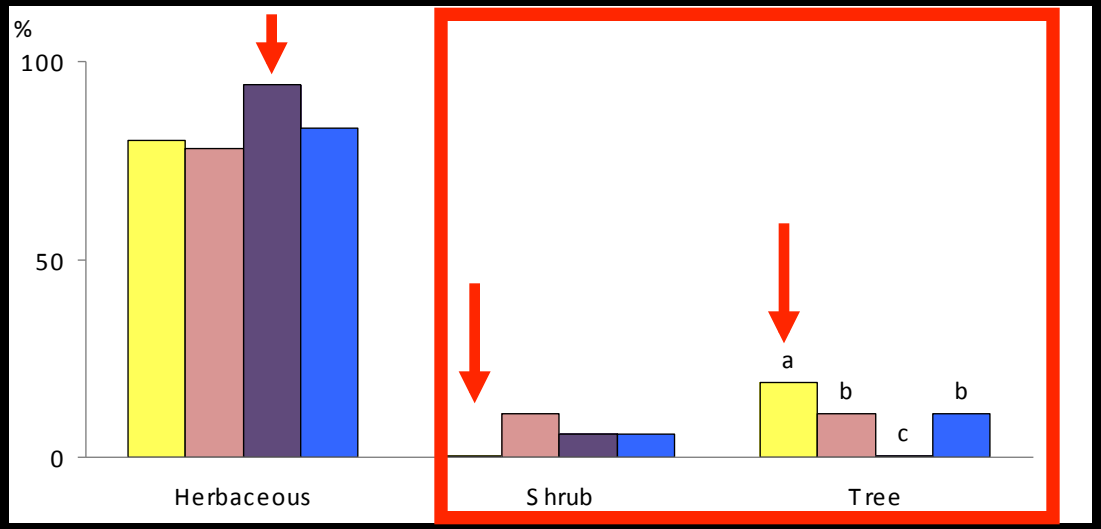
Percentage of vegetation components in the diet **SEASON**







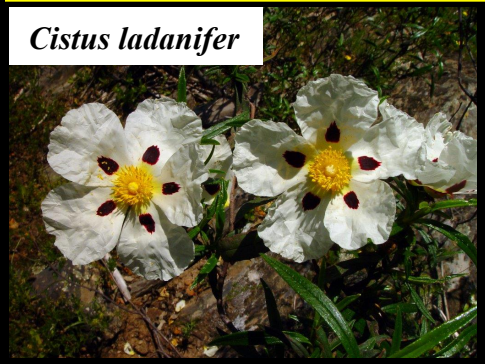
Autumn Winter Spring Summer



3. Results

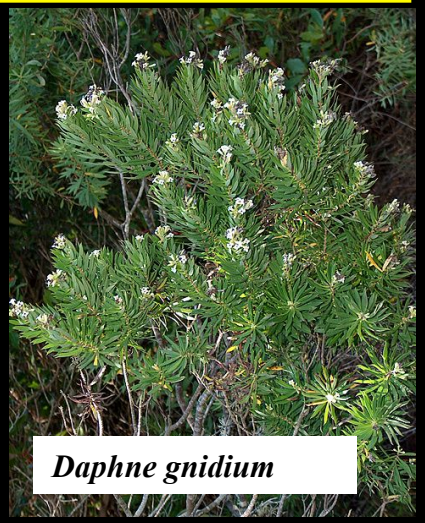
Shrub species

Cistus ladanifer



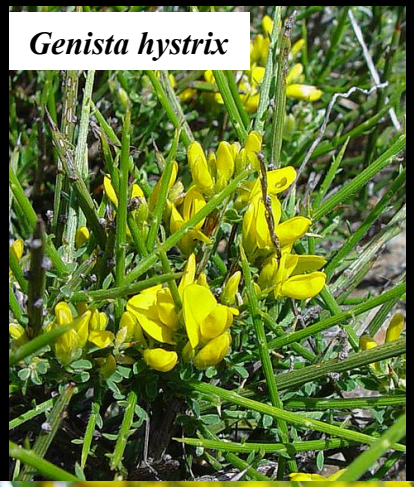
Lavandula pedunculata

Erica scoparia



Daphne gnidium

Genista hystrix



Erica arborea

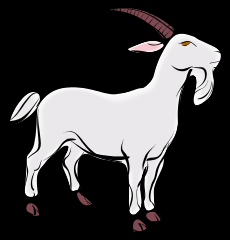
Cytisus scoparius

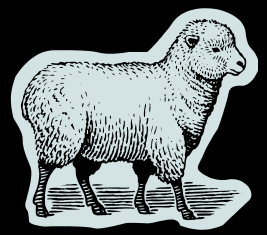
Cytisus multiflorus

Rubus sp.

3. Results

Percentages of shrubs species consumed by goats and sheep grazing



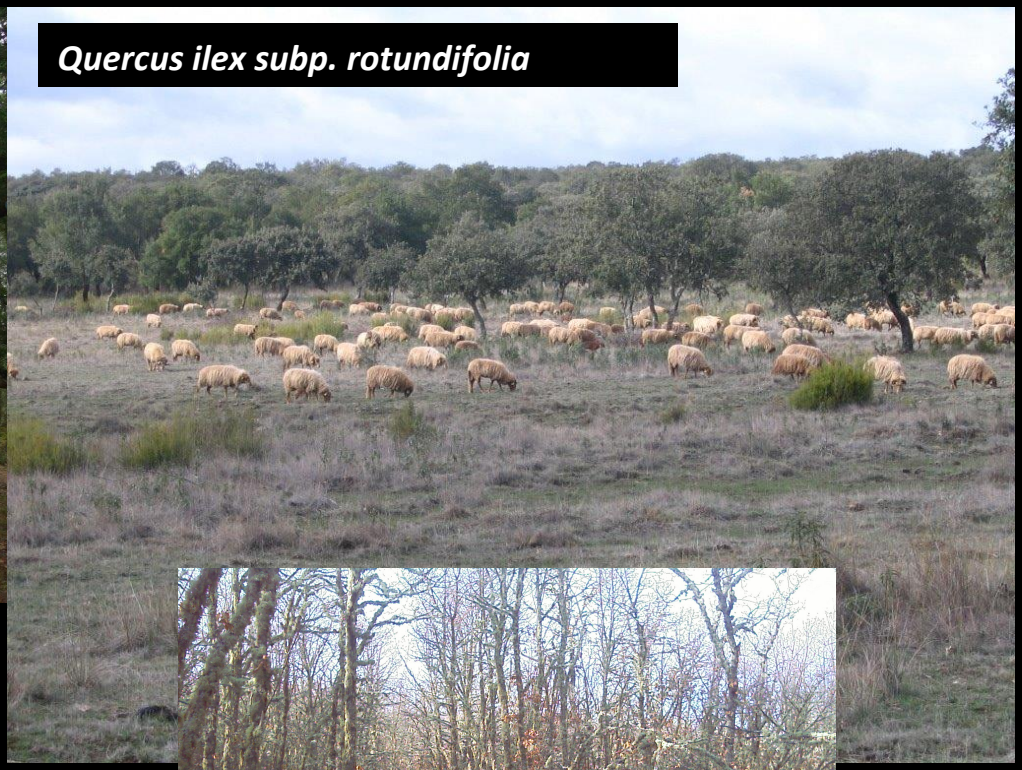


3. Results

Tree species

Quercus suber

Quercus ilex subp. rotundifolia



Quercus pyrenaica

3. Results

Tree species

Olea europaea

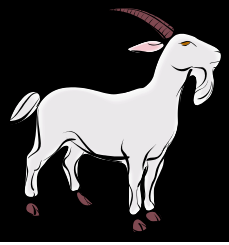
Alnus glutinosa

Fraxinus excelsior

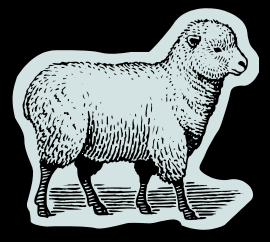
Castanea sativa

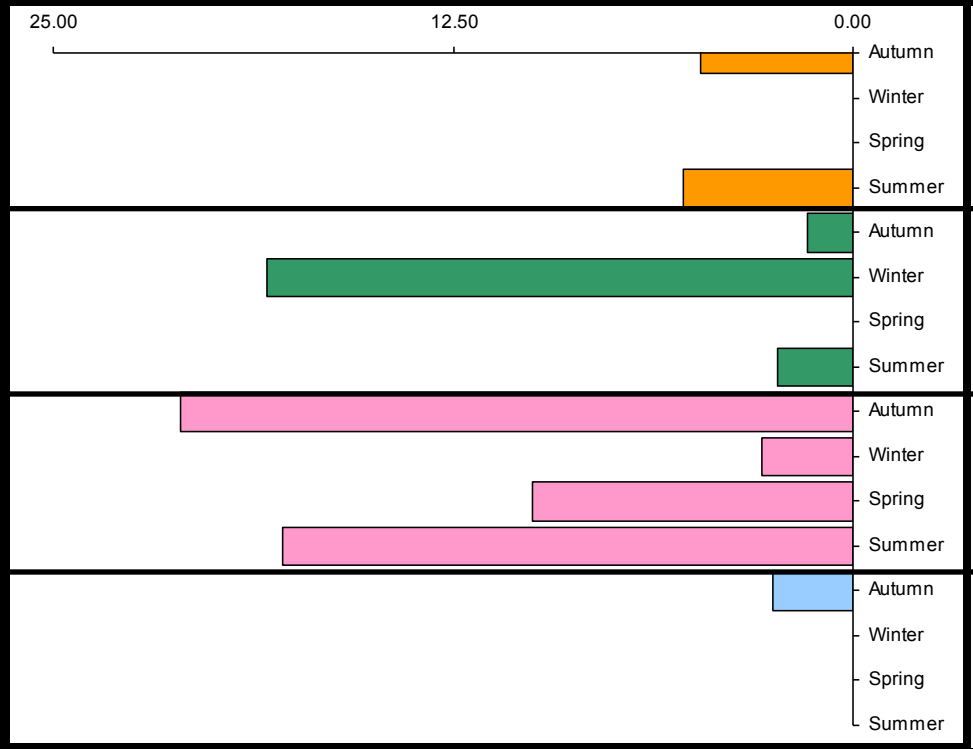
3. Results

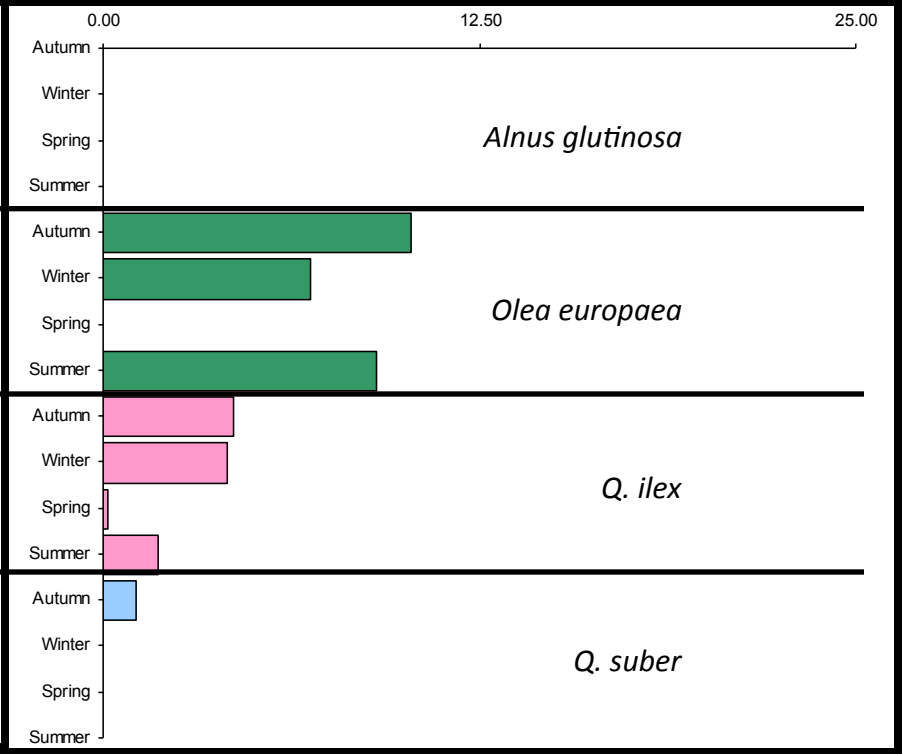
Percentages of tree species consumed by goats and sheep grazing



Tree species

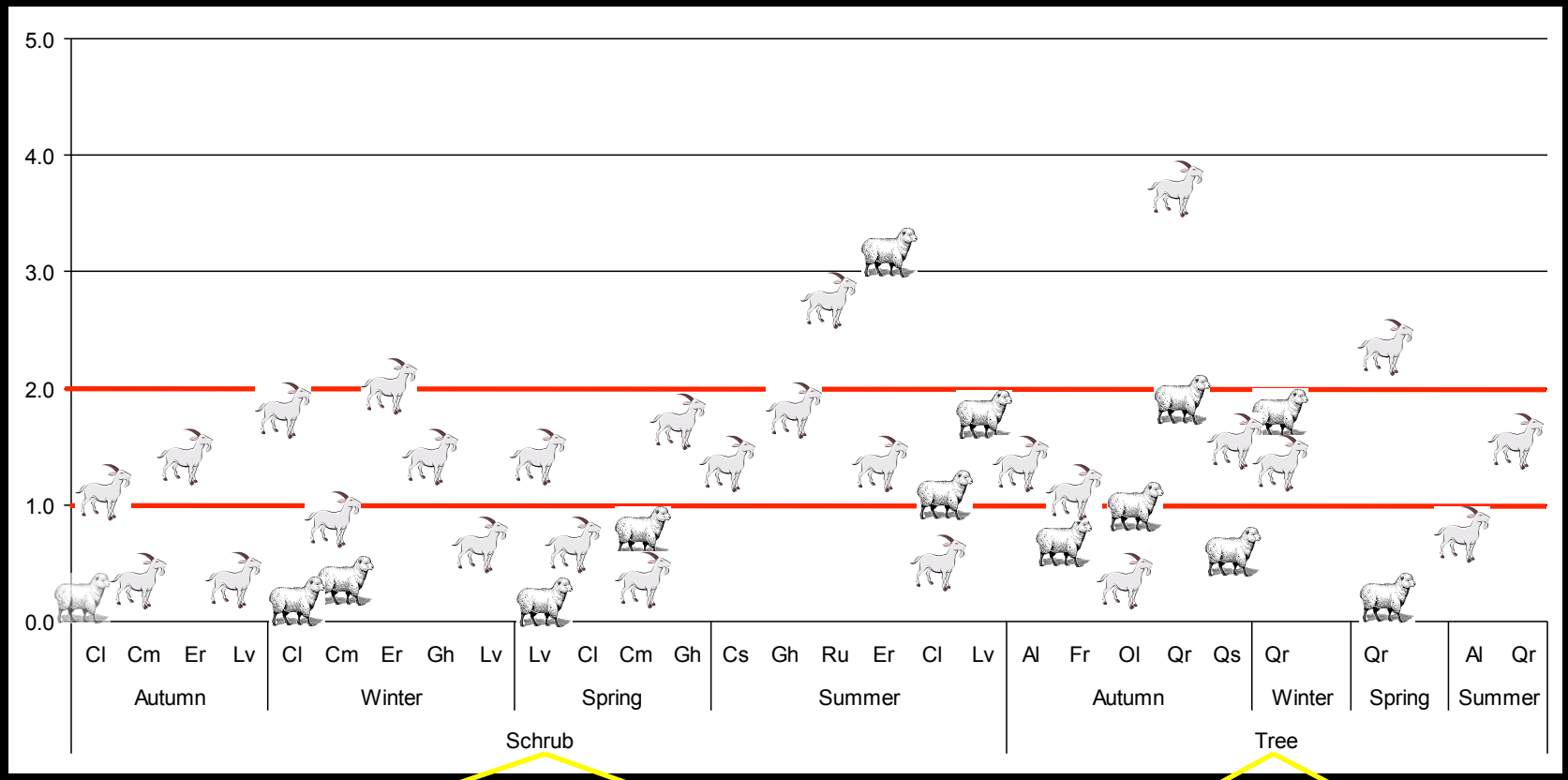






3. Results

Krueger´s preference index (RP)



Cl: *Cistus ladanifer*; Cm: *Cytisus multiflorus*

Cs: *Cytisus scoparius*; Gh: *Genista histrix*

Er: *Erica* sp.;Lv: *Lavandula pendulata*; Ru: *Rubus* sp.

Al: *Alnus glutinosa*; Ol: *Olea europea*

Qr: *Quercus ilex*; Qs: *Quercus suber*

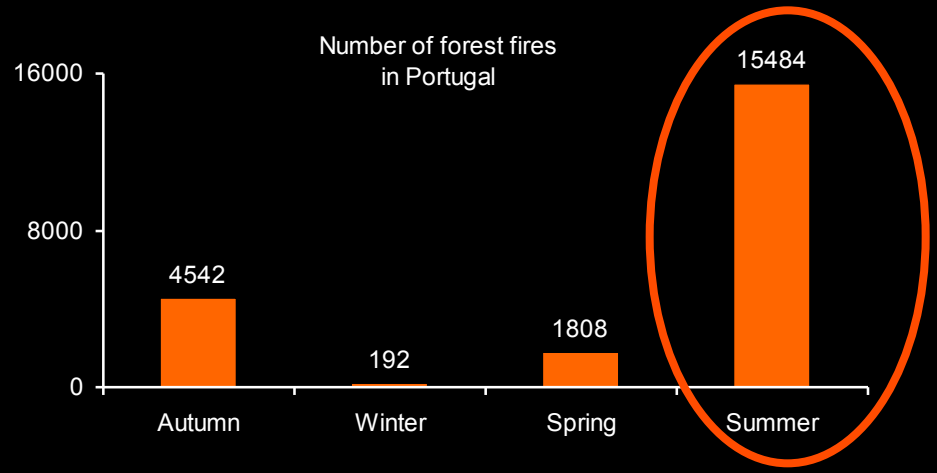
Species flammability (Valette,1990)

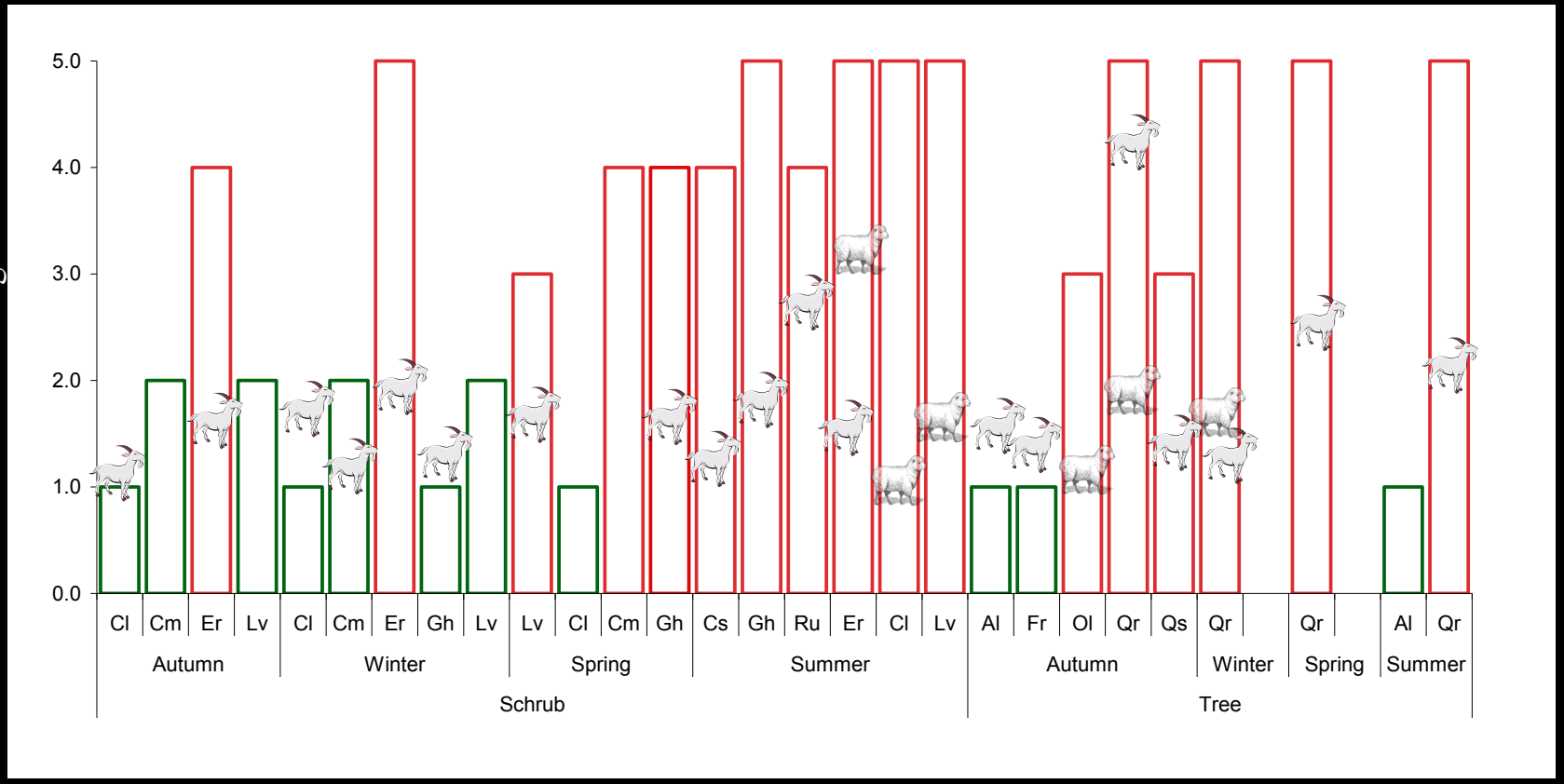
0 = Very low

1 = Low

2 = Moderate

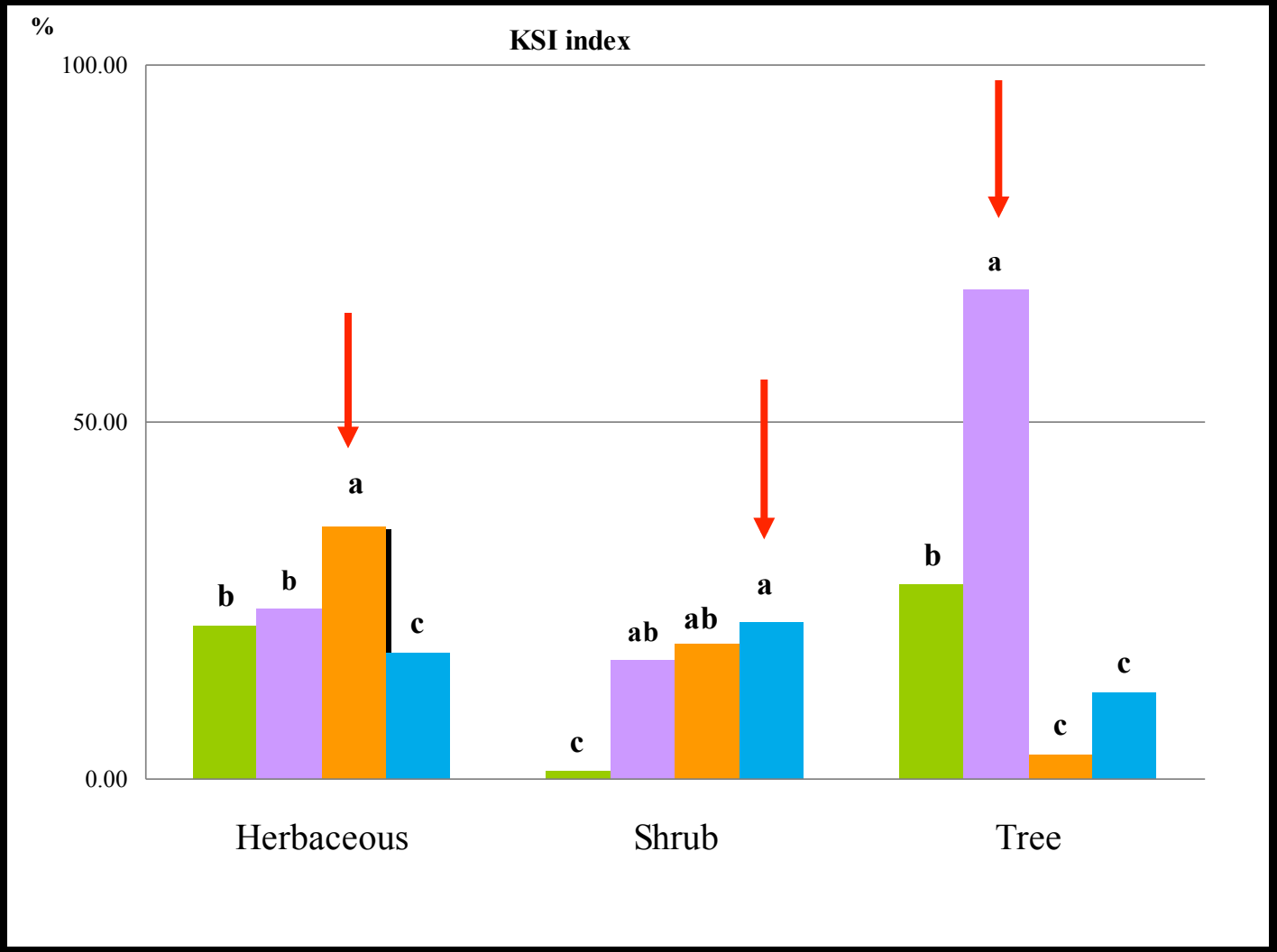
3 = Flammability
4 = High
5 = Very high





3. Results

Degree of overlap between diets



1. Introduction
2. Methodology
3. Results
4. Conclusions

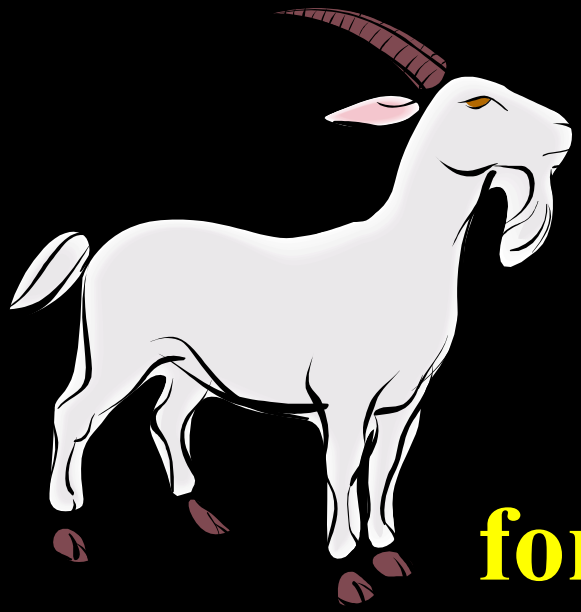
4. Conclusions

Goats and sheep showed a different pattern of consumption between themselves and also between seasons.

Goats showed a higher preference for trees and shrubs while sheep showed a higher preference for herbaceous.

In winter and summer, goats consume a greater quantity of woody species than herbaceous while, in spring they select more herbaceous species due to their high quality.

The use of small ruminants not prevent wildfires occurring but can contribute to reduce the large accumulations of vegetation that acts as fuel.



Thank you
for your attention